

CONTACT INFORMATION:

Head Office :

Beijing North Refractories Co., Ltd. Tel: 0086-10-62151268 Fax: 0086-10-62151268 Email: sales@northrefractories.com Add: Room 1108, Lucky Tower B, Dongsanhuan North Road, Chaoyang District, Beijing, China. 100027 Website: http://www.northrefractories.com

Plant :

Qingdao North Refractories Co., Ltd Tel: 0086-0532-83431277 Fax: : 0086-0532-83431277 Email: info@northrefractories.com Add: Nanshu Power Plant, Nanshu Town, QingDao City, China. 266613 Website: http://www.northrefractories.com



Technical Calcium Silicate Insulation & Fiber Insulation Materials

20 YEARS OF THERMAL INSULATION



COMPANY PROFILE

Beijing North Refractories Co., Ltd is a company focusing on thermal insulation materials production and supply. With more than 20 years of experience, North Refractories has been a famous manufacturer of calcium silicate insulation and fiber insulation products with various grades, giving integrated thermal insulation solutions for many industries such as energy, aerospace, automotive, marine, railway, industrial furnaces, oil and gas, steel, aluminum, foundry and so on.

Our main products include aluminum non wetting calcium silicate boards, light weight calcium silicate boards and pipes sections, ceramic fiber insulation materials, AES soluble fiber insulation materials, polycrystalline fiber wool, calcium silicate components made by CNC machines, they can be used separately or combined in an engineered solution that meets the specific requirements of your specific plant, application and market.

For a long time and for ever, our company has carried out the "Quality to be supreme, keep words honestly" and "new technology, customer is first" as management soul, president Mr Sun together with all stuffs welcome your visit and appreciate your support.



20 YEARS OF THERMAL INSULATION



CARBON FIBER REINFORCED CALCIUM SILICATE (NR-80)



NORTH REFRACTORIES

www.northrefractories.com



NR-80 is a carbon fiber reinforced high density calcium silicate board excellently suited for non-ferrous metal casting insulation, the materials are suitable for temperature as high as 1000°C, it can be directly contacted with liquid aluminum as its aluminum non-wetting property.

NR-80 is a ceramic material with an excellent performance of pseudoplastic because of the integrated carbon fiber in the calcium silicate matrix which makes the fracture toughness is very high, there is no any chemical bonding, propagating cracks lose their energy which is also visible in the strong fiber pull out. The fracture toughness is supported by the long fibers and considerably increases the work of fracture.

Due to the non-problematic fracture performance of NR-80 materials, it is an ideal material where there are high tensile and torsion forces, cracks will not make complete failure of the special parts. Typical application includes hot top rings, transition plates, header plates, spouts, casting box etc.

TYPICAL SPECIFICATIONS

- Color : grey
- Density: 810 kg/m³
- Size: 1200 x 1200 or 2400 x 1200mm
- Thickness: 20- 130 mm
- Cold Compressive Strength: > 18 Mpa
- Shrinkage 750 °C 12Hrs Linear : 0.2%
- Thermal Conductivity (W/m.K): 0.22 @ 700°C
- Chemical analysis CaO: 38-52% SiO2: 45-55%

SEPCIAL FEATURES

Nonproblematic pseudoplastic frature behavior Non-wetting with molten non-ferrous metals High performance on shock resistance Dimensions are stable low thermal conductivity Precisely machinable in small tolerance Enery saving for production Easy to install

GLASS FIBER REINFORCED CALCIUM SILICATE (NR-85)



NR-85 materials ideal choices for billet and ingot casting, such as the components in horizontal and vertical casting units, like nozzles, spouts, floats, hot top rings.

NR-85 materials are the standard grade used for foundry casting process such as LDPC, HDPC, CPC and gravity casting. Normally it can be used for bushings, nozzles, connecting launders and casting boxes.

TYPICAL SPECIFICATIONS

- Color: white
- Density: 850-1200 kg/m³
- Size: 1200 x 1200 or 2400 x 1200mm
- Thickness: 15- 120 mm
- Cold Compressive Strength: > 20 Mpa
- Shrinkage 750 °C 12Hrs Linear: 0.3%
- Thermal Conductivity (W/m.K): 0.25 @ 700°C
- Chemical analysis CaO: 38-52% SiO2: 45-55%

NORTH REFRACTORIES

20 YEARS OF THERMAL INSULATION

NR-85 is a glass fiber reinforced ceramic based calcium silicate board. It has a bulk density of 850 to 1100 kg/m3 with limits temperature of 1000° C. The material is not wetted by liquid NF-metals and therefore it is an ideal material for casting applications which can be contact with molten metals. It is designed specifically for use in aluminum casting, the foundry and furnace industries, and other thermal processing applications.

• FEATURES

Good insulation Low thermal conductivity Stable Dimensions Non-wetting with liquid NF-metals Precise machinable in small tolerances



TECHNICAL CALCIUM SILICATE COMPONENTS 1000 °C



NORTH REFRACTORIES

www.northrefractories.com

North Refractories manufacture various grades and types of technically advanced insulating calcium silicate boards for molten metal applications. These non-asbestos materials are available in sheets or as precision machined components which is made by CNC tooling equipment to meet customer special required specifications.

PROPERTIES & ADVANTAGES

- Low thermal conductivity
- Extremely high thermal shock resistance and fracture toughness
- Non wetted by liquid non-ferrous metals
- Non reactive to lubricants such as boron nitride or graphite
- Asbestos free
- Excellent machinability

APPLICATIONS

- Billet and ingot casting as transition plates, floats, spouts
- Head boxes for continuous casters
- Tips for continuous sheet casters
- Sprue bushes, tubes, nozzles and feeder box liner in low pressure die casting
- Hot face linings for dosing/holding furnaces
- Launders and dams

FURNACE INDUSTRY

- Load bearing housings
- Structural insulation where high thermal and/or mechanical load is required

OIL & GAS INDUSTRY

- Collars, gaskets and pipe support rings
- Spacers and bushes

ITEMS	Unit	NR - 60	NR - 80	NR - 85	NR - 95	NR - 110
Density	Kg/m ³	550	810	860	950	1100
Modulus of rupture	MPa	≧4	≧8	≧7	≧8	≧11
C.C.S	МРа	≧8	≧17	≧15	≧18	≧24
Thermal Conductivity	W/m°K					
	200°C	0.1	0.13	0.14	0.16	0.20
Mean Temperature	400°C	0.12	0.15	0.16	0.17	0.26
	500°C	0.15	0.15	0.16	0.20	0.28
	700°C	0.20	0.21	0.21	0.25	0.28
Loss on ignition	%	<8	<8	<8	<8	<8
Thermal shrinkage 24hr		649°C	732°C	732°C	870°C	870°C
@ Length or Width	%	0.6	0.12	0.2	0.3	0.35
@ Thickness	%	1.5	1.00	1.1	2.4	2.5
Screw Holding Strength @ 22mm	N	800	1150	1100	1200	1350
penetration						
Standard Sizes		2400 x 12	200 mm, 11	200 X 1200	mm	
Typical Thickness	13, 19, 25, 30, 38.1, 50.8, 63, 75,100,110					

We have more grades not limited to the above chart, please contact us for your special request

HIGH STRENGTH RIGID INSULATION BOARD



• APPLICATIONS

- Ladle & Tundish Insulation
- Lime Kiln and Cement Kiln Insulation
- High temperature insulation Gaskets
- Boiler & Furnace Insulation
- Oil & Gas Burners Insulation
- Furnace, Dryer, and Oven Insulation
- High temperature Pipe Insulation

Technical Data of High Strength Insulation Board for Steel Ladle

Item	Unit	NR-85L
Bulk Density	kg/m ³	800-900
Flexural Strength	MPa	≥6
Compressive Strength	MPa	≥12
Linear Shrinkage Rate (1000 °C ×3h)	%	≤2.0
Working Temperature	°C	1000
Thermal Conductivity	W/m.k	≤ 0.13

Dimension and Tolerance

Length * Width (mm)	Max.12
Thickness (mm)	10-50r
Tolerance (mm)	-3, +3(

Note: We can process the high strength insulation board for steel ladle into different dimensions according to the needs of customers such as 500*500mm,400*400mm,650*150mm,300*114mm etc.

NR-85L boards are calcium silicate based refractory insulation boards made of mineral fibers and calcium silicate free of ceramic fibers. These insulation boards possess unique combination of properties for various industrial applications in furnace backup insulation, high temperature gasketing & seals.

NR-85L board has excellent performance on thermal conductivity and dimensional stability, it is an ideal material for industrial insulations with highest demands, such as steel ladles. It can be processed with standard woodworking tools and can easily be adjusted to the design requirements.

- Refractory insulation expansion joints
- Metal clad Gaskets fillers
- Gaskets for centrifugal casting
- Glass rollers as washers on mandrel
- Stainless Steel Plant Rollers Insulation
- Electrical & home appliances insulation gaskets
- Fire Resistant Doors, Lifts, Safes, Cupboards

00*600
IM
ength and Width); ±0.5(Thickness)



CALCIUM SILICATE BOARDS 1000°C



• FEATURES

Low thermal conductivity that remain stable over a wide temperature range up to 1100 °C

- Excellent resistance to thermal shock
- Non-combustible
- Minimal shrinkage, even when exposed to continuous maximum rated temperatures
- Excellent compressive and flexural strength
- Excellent machineability
- Wide range of densities
- Excellent electrical insulating properties when dry
- Resistant to oils, weak alkalis and many other chemicals

Calcium silicate boards are white, non-asbestos, high temperature structural insulating boards that exhibit good thermal shock resistance and stability, consistently low thermal conductivity, high structural strength at elevated temperatures, incombustibility, electrical insulating properties when dry, excellent machinability, insolubility in water, and non-corroding properties.

TYPICAL APPLICATIONS

- Petrochem furnaces, process piping and equipment
- Glass forehearths, melting furnaces
- Metals and their processing
- Energy power plants, fuel cells, solar plants, building insulation
- Industrial Furnaces
- Chimney industrial and domestic

ITEM			NR CAL-SIL BOARDS 1000°C				
		Unit	NRH-20	NRH-23	NRH-25	NRH-27	
Bulk Density (Dry)		kg/m³	200±10%	230±10%	250±10%	270±10%	
Modulus of Rupture		MPa	≥0.35	≥0.45	≥0.50	≥0.55	
Cold Crushing Strength (At 5% Deformation R	loom Temp.)	MPa	≥0.60	≥0.80	≥0.90	≥1.0	
Service Temp. Limit		°C	1000	1000	1000	1000	
Linear Shrinkag		%	≤2 (1000°C,16hrs)	≤2 (1000°C,16hrs)	≤2 (1000°C,16hrs)	≤2 (1000°C,16hrs)	
Thermal Conductivity	W/m.k	200°C	0.075	0.085	0.095	0.098	
		400°C	0.098	0.100	0.108	0.110	
		600°C	0.150	0.152	0.156	0.158	
		800°C	0.210	0.214	0.216	0.218	
Compression Strength at 10% Deformation after		Мра	0.32 16hrs*1000°C	0.40 16hrs*1000°C	0.45 16hrs*1000°C	0.50 16hrs*1000°C	
Porosity		%	90.8	90.6	90.4	90	
Moisture Content (by weight)		%	3-5				
PH Value			8—9				
Color			white				
Surface Condition		1.Original dimple pattern 2. Double sanded, smooth and good flatness					
Note: Multi-apertured calsil board tends to absorb moisture up to 4 times its dry weight if exposed in direct contact with water, normally certain percent free water content in ex-works board, sample must be dried to constant weight at 105°C in drying oven.					er, normally certain		

CALCIUM SILICATE BOARDS 1100°C



APPLICATIONS

- Aluminium (anode baking furnace and electrolysis cells)
- Glass Industry (Smelting, forming and heat treatment furnaces)
- Ceramic Industry (Kiln cars, chamber and tunnel furnaces)
- Cement Industry (heat exchangers and cyclone separators) • Oil & Gas (Crackers, Reformers, Fired heaters)
- Insulation of floor, ceiling and rear wall of fireplaces
- Rear wall fireplace or stove

1751			NR CAL-SIL BOARD					
IIEM		Unit	HCS-23H	HCS-25H	HCS-27H	HCS-30H		
Bulk density		kg/m³	230±10%	250±10%	270±10%	300±10%		
Flexural Strength		Мра	≥0.45	≥0.50	≥0.55	≥0.60		
Compressive Strength		Мра	≥0.8	≥0.9	≥1.0	≥1.1		
Thermal Cond W/m.k	200°C	0.085	0.095	0.098	0.102			
)A//ma.l.	400°C	0.100	0.108	0.110	0.116		
	600°C	0.152	0.156	0.158	0.164			
		800°C	0.214	0.216	0.218	0.226		
Service Temp.Limit		°C	1100	1100	1100	1100		
Linear Christian (EN 1004 C 1000)		%	≤2	≤2	≤2	≤2		
Enical Shimkage (EN 103	-0-1330)	-70	(1050°C,12hrs)	(1050°C,12hrs)	(1050°C,12hrs)	(1050°C,12hrs)		

NOTE: No China Standard for 1100C ca-si-board at present, so we use Europe standard EN1094-6-1998 for linear shrinkage test, 12h at 50°C below max, service temp

Calcium silicate boards are low density insulating boards with excellent insulation value, high mechanical strength and good heat resistance. The boards are designed for maximum temperatures of 1100° C (1832° F) and are applicable as back up insulating lining in a wide variety of industries like Aluminium, Cement, Glass, Petrochemical & Chemical, Furnaces etc.

• Iron & steel (Smelting and heat treatment furnaces)

- Paper and Pulp Industry
- Mantelpieces, or surrounds for fireplaces and stoves
- Chimney casings
- Industrial furnaces



CS PIPE & BLOCK INSULATION 650°C



NORTH REFRACTORIES

www.northrefractories.com

NRX-12 is a filter pressed, high-temperature calcium silicate block & pipe insulation manufactured by North Refractories with exceptional structural strength, composed of hydrous calcium silicate for use on systems operating up to 1200°F (649°C)

NRX-12 meets or exceeds the physical property requirements in accordance with ASTM C533 Type I.

It contains integral inorganic silicate chemistry to inhibit corrosion under insulation

• ADVANTAGES

- Guards pipe and equipment surfaces against corrosion;
- Excellent resistance to breakage and physical abuse;
- No binders to burn out = No loss of insulation integrity;
- Superior thermal performance from 450°F to 1200°F (650°C);
- Resistant to mould growth;
- Fast, easy installation;
- Large selection of sizes and forms

APPLICATIONS

NRX-12 is especially recommended for use in the petrochemical, power generation and process industries where piping and equipment operating up to 1200° F (649° C). Its strength, low thermal conductivity, and durability makes it the preferred product for application on high temperature piping and equipment.

ITEM	Unit	NRX-12 CALSIL BOARDS 650°C			
	Offic	NRX-22	NRX-24		
Classification Temperature	°C	650	650		
Density	kg/m³	220	240		
Moisture	%	≤7.5	≤7.5		
Cold Crushing Strength	Мра	≥0.65	≥0.75		
Modulus of Rupture	Мра	≥0.3	≥0.35		
Conductivity, 100°C	W/(M.K)	0.062	0.062		
Work Temperature	°C	650	650		
Liner shrinkage	%	≤2	≤2		

HIGH TEMPERATURE AES FIBER BOARD



• FEATURES

- Waterproof
- Resistant to thermal shock
- Low thermal conductivity
- Precise geometry and close tolerances
- Homogeneous structure, easy for machining
- Non-brittle
- High fiber content
- Lightweight, low heat storage
- Easy to install

TYPICAL PARAMETERS

Code	AES-B-1260
Solubility(mg/l)	≥200
Shrinkage on Heating(%)	1000°Cx24h≼-4
Moisture Content(%)	≤1
Organic content(%)	≪6
Thermal Conductivity/(m.k) (Mean Temperature 500°C)	≤0.135
Theoretical Density(kg/m ³)	280±15
Compressive Strength(MPa)	≥0.1
Specification(mm)	900x600x25/50
MgO+CaO(%)	≥18

• DESCRIPTIONS

NR soluble fiber boards are made from soluble fiber and a small amount of organic binder. Due to the high fiber content, NR soluble fiber boards are strong, lightweight and thermal shock resistant. Thickness over 50mm is obtained by bonding resistance two thinner sheets.

TYPICAL APPLICATIONS

- Refractory lining for industrial furnaces in walls, roofs, doors, stacks, etc
- Combustion chamber liners, boilers and heaters
- Back-up insulation for brick and monolithic refractories
- Transfer of molten aluminum and other nonferrous metals
- Expansion joint boards
- Barrier against flame or heat
- Hot face layer for high velocity or abrasive furnace atmosphere
- Atmosphere







NORTH REFRACTORIES

www.northrefractories.com

NR AES wool blanket is a body soluble fiber that utilizing a unique spinning technology and mechanical properties. These special fibers are made from a blend of calcium, silica and magnesium which give fiber the ability to support continuous applications under high temperature conditions. NR AES wool blanket is flexible and competent in treating with the refractory linings, thermal insulation and metals transfer, it has been Proven superior and eco-friendly to traditional refractory ceramic fibers.

• FEATURES

- Low thermal conductivity
- Low heat storage
- High tensile strength
- Thermal shock resistance
- Light weight

TYPICAL APPLICATIONS

- Back-up insulation for dense refractory
- Annealing furnace linings
- Stress relieving blanket
- Heat treatment furnace linings
- Crude heater linings

Code	AES-C-1260		
Chemical Composition (%)	Chemical Composition (%)		
SiO2	55-65		
CaO	23-35		
MgO	5-10		
Physical Properties	·		
Density(kg/m³)	96	128	
Color	White	White	
Tensile Strength(Mpa)	0.04	0.05	
Fiber Diameter(um)	3.5	3.5	
Shot Content(%)	12	12	
Linear Shrinkage after Heating(%)	1000°Cx24h≤2.5	1000°Cx24h≤2.5	
Thermal Conductivity(W/m.k)	0.065	0.048	
200°C	0.065	0.048	
400°C	0.098	0.087	
600°C	0.153	0.135	

The data shown are average results of tests under standard procedures and are subject to variation. Results should not be used for specification purposes or creating any contractual obligation. For more information on the safety application or materials, please refer to the work practices and material safety data sheet.

HIGH TEMPERATURE AES FIBER PAPER



• FEATURES

- Easy to cut, wrap or form
- Temperature stability
- Low thermal conductivity
- Excellent flexibility
- High fired tensile strength
- Excellent flame resistance

TYPICAL PARAMETERS

Code	NR-1260S
Moisture Content(%)	≤1
Organic Content(%)	≤10
Theoretical Density(kg/m ³)	200±15
Tensile Strength(MPa)	≥0.3
Specification(mm)	40000/30000/20000/10000x610/1220x1/2/3/4/5

The data shown are average results of tests under standard procedures and are subject to variation. Results should not be used for specification purposes or creating any contractual obligation. For more information on the safety application or materials, please refer to the work practices and material safety data sheet.

NR Bio-soluble fiber paper is a lightweight refractory material processed form soluble fibers into a highly flexible, uniform sheet. It is recommended for continuous use at temperatures up to 1000°C.

NR Bio-soluble fiber paper has low shrinkage, good handling strength and low thermal conductivity.

It contains a small amount of organic binder which makes it flexible, and reduces off-gassing and odour during using.

• TYPICAL APPLICATIONS

- Replacement of asbestos paper
- Investment cast mold wrap insulation
- One-time consumable insulating applications
- Back-up lining for metal troughs
- Hot top lining
- Applications where low binder content is required
- Thermal and electrical insulation
- Upgrade for fiberglass paper and blanket

NORTH REFRACTORIES 11



CERAMIC FIBER BLANKET



• FEATURES

- Excellent insulating performance
- High tensile strength
- Excellent thermal stability
- Low heat storage
- Excellent thermal shock resistance
- Low thermal conductivity
- Good sound absorption

Ceramic fiber blanket is made from common, high pure, zirconia, chromic alumina silicate fiber, after the process of needling, thermoforming, crossbar cutting, rolling up ,etc. which is through double-sided needling operation by using spun technology. Needling blanket in different size and thickness provide users a wide range of material selection to gain the best heat insulation structure and energy saving effect. They offer superior thermal insulation and refractory performance as well as acoustic characteristics. North Refractories Blankets are unaffected by the most chemicals except hydrofluoric and phosphoric acids and strong alkaline with excellent strength and mechanic properties before and after heating. Thermal and physical properties are retained after drying from oil, steam and water.

TYPICAL APPLICATIONS

- Furnace and kiln refractory lining
- Boiler, pipe and duct insulation ٠
- Furnace door seals •
- Heat treatment controls ٠
- Fireproof for the construction and industries •
- Thermal insulation for nuclear power plant •
- Soaking pit covers and seals.

Туре	STD	HP	HA	HZ
Classification temperature (°C)	1100	1260	1360	1430
Color	white	white	white	white
Density (kg/m³)	80/96/128/160	80/96/128/160	80/96/128/160	80/96/128/160
Permanent linear shrinkage (24 hours)	-4~0 (1000°C)	-3~0 (1000°C)	-3~0 (1100°C)	-3~0 (1350°C)
Thermalconductivities (Wm.k)	0.09	0.09	0.12	0.16
	(400°C)	(400°C)	(600°C)	(800°C)
	0.16	0.16	0.20	0.20
	(800°C)	(800°C)	(1000°C)	(1000°C)
Al2O3 (%)	42-44	45-46	52-55	39-40
Al2O3+SiO2(%)	96	98	99	-
Al2O3+SiO2+ZrO2(%)	-	-	-	99
ZrO2 (%)	-	-	-	15-17

CERAMIC FIBER BOARD



• FEATURES

- High rigidity and light weight
- Low thermal conductivity
- Resistance to thermal shock and gas erosion
- Easy cutting and engineering, mechanical flexibility
- Resists penetration by molten aluminum and other non-ferrous metals.

Density (kg/m³)	280/300/320	280/300/320	280/300/320			
Classification Temperature(°C)	1260	1260	1430			
Maximum Operating Temperature(°C)	1100	1200	1350			
Water Content(%)	≤1	≤1	≤1			
Linear Shrinkage after Heating(%)	1000°C*24h,-3~0	1100°C*24h,-3~0	1350°C*24h,-3~0			
Thermal Conductivity(W/m.k)						
200°C	0.074	0.055	0.078			
400°C	0.092	0.073	0.102			
500°C	0.103	0.086	0.116			
600°C	0.127	0.105	0.135			
Cold Crushing Strength(MPa)	0.2	0.12-0.2	0.12			
Loss of Ignition(wt%)	≤7	≤7	≤7			

The data shown are average results of tests under standard procedures and are subject to variation. Results should not be used for specification purposes or creating any contractual obligation. For more information on the safety application or materials, please refer to the work practices and material safety data sheet.

20 YEARS OF THERMAL INSULATION

Ceramic fiber board is manufactured and designed for the thermal applications requesting high demands on rigidity, the thermal insulation properties and abrasion resistance of ceramic fiber board have been further improved due to the higher density. Ceramic fiber board is a vacuum formed product that resists higher gas velocities than ceramic fiber blanket. It is ideal for furnace, boiler duct and stack lining thanks to its low thermal conductivity and low heat storage, which makes the shorter cycle times and quicker access for maintenance in the industrial furnaces possible.

TYPICAL APPLICATIONS

- Refractory lining for industrial furnaces
- Combustion chamber liner, boilers and heaters •
- Back-up insulation for monolithic refractories
- Transfer of non-ferrous metals
- Expansion joint boards •
- Barrier against flame

NORTH REFRACTORIES 13

CERAMIC FIBER INORGANIC BOARD [NO SMOKE]



NORTH REFRACTORIES

www.northrefractories.com

• FEATURES

- Without any organic bond
- No smoking non-black surface, no smell when heating
- Thin, up to 2mm
- Low shrinkage, and excellent stability
- Low thermal conductivity excellent thermal performance
- High strength, excellent Machining performance
- Can be used on hotface, direct contact fire
- Excellent thermal shock resistance

TYPICAL PARAMETERS

Classification temperature(°C)		1260	
Recommended working temperature(°C)		≤1000	
Colour		V	Vhite
Bulk density(kg/m³)		300	
Incombustibility		Class A1	
Shrinkage on heating(1000°C×24h),%		-3~0	
	Mean 300°C	0.08	
hermal conductivity (w/m.k)	Mean 400°C	0.09	
	Mean 500°C	0.10	
Compressive strength(MPa)		≥0.10	
Size(mm)		1200×1000×(8/10/13)	1200×600×(6/8/10/13)
		600×400×(2)	/3/4/5/6/8/10/13)
Size tolerance		Length & width tolerance: ±2mm; Thickness tolerance: ±0.5r	
Density tolerance		±20kg/m ³	

The data shown are average results of tests under standard procedures and are subject to variation. Results should not be used for specification purposes or creating any contractual obligation. For more information on the safety application or materials, please refer to the work practices and material safety data sheet.

NR ceramic fiber inorganic board is the ceramic fiber board with the thickness of 2~13mm, made from the every grade of ceramic fiber wool removed the shots, and adding proper proportion of organic and inorganic binders. The product doesn't have nay organic binder, will cause smoke, smell and darkness on the boards. is an ideal material for household appliance

Comparing with the regular ceramic fiber, the thin boards have lower shot content, lower thermal conductivity, more acute size, hardness and strength. The product doesn't have any organic binder, will not cause smoke, smell and darkness. Because of the thickness, the boards doesn't have the shot, and excellent performance on high temperature resistance, can be widely used in the industries of fireproofing, refractory and insulation, especially in the household appliance.

TYPICAL APPLICATIONS

- Insulation material for household appliances
- Surface lining to avoid thermal radiation
- Insulation material for household appliances such as gas boiler

CERAMIC FIBER MODULES



• FEATURES

- Fast and easy installation • Lower heat storage and fuel costs
- Easy repair and low insulation costs

• TYPICAL APPLICATIONS

- Stack linings
 Refining and Petrochemical Boiler insulation
- Pyrolysis furnace lining Reformer furnace roof and walls

TYPICAL PARAMETERS

Description	STD Module	HP Module	HZ Module		
Chemical Composition (%)					
Al203	≥44	≥45	≥34		
SiO2	≥52	≥54	≥50		
Fe2O3+TiO2	≤1.0	≤0.5	≤0.5		
ZrO2	-	-	≥15		
K2O+Na2O+Fe2O3	≤1.0	≪0.2	≤0.2		
Physical Properties					
Density(kg/m ³)avg	220	220	220		
Classification Temperature(°C)	1260	1260	1430		
Liner Shrinkage after Heating(%)	1000°Cx24h≤2.5	1100°Cx24h≤2.5	1350°Cx24h≤3.5		
Thermal Conductivity (W/m.k)					
400°C	0.090	0.101	0.118		
500°C	0.119	0.120	0.149		
600°C	0.152	0.175	0.172		

The data shown are average results of tests under standard procedures and are subject to variation. Results should not be used for specification purposes or creating any contractual obligation. For more information on the safety application or materials, please refer to the work practices and material safety data sheet.

14 NORTH REFRACTORIES

20 YEARS OF THERMAL INSULATION

NR ceramic fiber modules are made from compressed ceramic fiber blanket. These modules are specially designed to meet or improve the thermal insulation requirements of industrial furnaces in some special thermal conditions. NR ceramic fiber modules are produced with various anchoring systems to enable quick, easy and efficient installation in most furnace linings. Modules have the reliable thermal maintenance and long time treatment. Module linings prevent heat loss, increasing the furnace productivity and reducing maintenance costs. Anchors available- S304, S310

Fast temperature cycling

Ethylene furnace roof and walls

POLYCRYSTALLINE FIBER BLANKET 1600°C

Our PCW fiber blankets are ideal for high temperature and chemically aggressive applications. These fibers are manufactured by sol-gel technology using processes specifically designed to produce fibers of defined dimensions.

NR 1600C blankets are more resistant to acid and alkaline solutions than conventional alumino-silicate fiber blankets and have exceptionally good thermal insulation characteristics. They are classified to 1600°C (2912°F).

Our high temperature insulating fiber blankets provide thermal insulation in processing of metals, petrochemicals, cement, ceramics and glass, and are used by manufacturers of equipment for aerospace, automotive, marine and domestic applications. Typical applications include:

• FEATURES

- Excellent high temperature stability • Tiny shrinkage on heating
- Low shot content, Prominent refractory and insulation performance

NORTH REFRACTORIES

www.northrefractories.com

- High blackness, good heat reflection performance Low heat storage, low thermal conductivity
- Uniform fiber diameter distribution, high tensile strength Strong wind resistance
- Good high temperature flexible performance, excellent thermal shock and Mechanical Vibration resistance
- Stable chemical performance, high corrosion resistance
 - Chimney and duct insulation in power generation plants • Linings and back-up insulation for all types of furnaces, heaters and kilns
- Pipe insulation in high temperature processing plants
- Insulation of steam turbines and hot boxes • Exhaust and heat shield cladding
- Vehicles and domestic appliance insulation

TYPICAL PARAMETERS

Code		NR-B-1600	
Classification Temperature(°C)		1600	
	Al2O3(%)	72	
Chemical composition	SiO2(%)	28	
	trace(%)	0.2	
phase composition(X-ra	ay scattering techniques)	Mullite Crystal Phase	
Desntiy	/(Kg/m ³)	96/128	
Fiber dia	meter(µm)	5	
Shot content(Φ≥0.212mm)(%)		≤2	
Specific heat(J/Kg.k)		1.17×103~1.21×103	
Fiber tensile strength(span length5mm)(MPa)	1000	
Blanket tensile strength(MPa)		0.08~0.1	
	600°C	0.16	
	600 C	0.10	
	800°C	0.10	
Thermal conductivity (W/m.k)	800°C 1000°C	0.10 0.22 0.32	
Thermal conductivity (W/m.k)	800°C 800°C 1000°C 1200°C	0.10 0.22 0.32 0.45	
Thermal conductivity (W/m.k)	800°C 800°C 1000°C 1200°C 1400°C	0.16 0.22 0.32 0.45 0.65	

POLYCRYSTALLINE MULLITE FIBER BOARD 1600-1900°C



• FEATURES

It is characterized in white appearance, smoothness, softness and elasticity, just like pledget. PMF is a polycrystalline mullite fiber in the existing form of mullite crystalling phase, with a unique structure, complicated manufacturing process and high technical content.

- High temperature stability to 1600-1800C
- Ideal for use as furnace insulation in sintering, heat treating and chemical thermal process systems
- Non-Flammable Excellent thermal shock resistance
- Resistance to most chemical attack; it has excellent stability in acid metal slags and is insoluble in most acids
- Resistance to oxidation and attack by furnace atmospheres
- Resistance to abrasion Good electrical resistivity
- Can be used as insulation packing in furnace spaces and around furnace sight tubes & ports
- Fill in expansion joints and masonry cracks inside of furnaces.

		1600 BOARD	1700 BOARD	1800 BOARD	1900 BOARD
Working Temperature (°C)		1500	1600	1700	1750
Density (kg/m³)		400	350	400	700
Linear shrinkage(%)*8h		0.1	0.2	0.1	0.3
	at 600°C	0.14	0.12	0.12	-
Thermal conductivity	at 800°C	0.17	0.15	0.16	0.11
(w/m.k)	at 1000°C	0.24	0.18	0.19	0.14
	at1200°C	-	-	-	0.17
Chemical	AL ₂ O ₃	64	75	75	87
Component(%)	AL ₂ O ₃ +SiO ₂	98	99	99.5	99.5

NR PCW board is a high temperature vacuum formed board made of polycrystalline bulk fibres and binders. It is rigid with very good dimensional resilience and has low shrinkage up to its classification temperature whilst retaining good thermal conductivity. NR PCW board is resistant to thermal shock. Both the unfired and fired materials can be easily cut or machined. Typical applications include: expansion joints, furnace lining, electric kilns, laboratory equipment and glass & petrochemical industry.

- Excellent thermal stability





CERAMIC FIBER TAP OUT CONES





To pour the molten aluminium from melting or holding furnaces for aluminium casting, some units use tap hole block, which is sealed with Tap Out Cone.

NR vacuum formed cones are made from ceramic fiber, with smooth surface and the right hardness for the application.

• APPLICATIONS

• Aluminum alloy melting furnace for die casting industry

• Other shapes like sleeves or risers for sand casting foundry

• FEATURES

- Good thermal insulation
- Durable mechanical strength

SPECIFICATIONS

ltems	Length	Shape	Package	Special Package
Tan out cone 20.350mm		Cone shape / cylinder / 100-300pcs/box As re		As required
	20 3301111	open shape	100 300 pc3/ 500	Astequied

TECHNICAL PARAMETERS

		Rupture modulus	Thermal expansivity	Thermal conductivity	Max operating
Item	Density (g/cm³)	(816°C Mpa)	(680°C K-1)	540°C (W/k.m)	temperature (°C)
Index (%)	0.3	1.5	1.56*10-6	0.05	1100

SILICON NITRIDE HEATED PROTECTION TUBE



North Refractories supply a full ranges of silicon nitride ceramic thermocouple protection tubes which is used for molten aluminum and other non-ferrous industries.

Silicon nitride ceramic thermocouple protection tube protects the sensitive thermocouple element from aggressive compounds in the furnace atmosphere. Due to their very good thermal conductivity, the accuracy of the thermocouple reading is increased.

The silicon nitride ceramic has very high working temperature, up to 1200°C. It has good chemical resistance and good thermal conductivity for accurate metering.

SPECIFICATIONS

L (350-1500mm) / D 28 /16 MM

18 NORTH REFRACTORIES

20 YEARS OF THERMAL INSULATION





SI3N4 SILICON NITRIDE ROTOR AND SHAFT FOR DEGASSING AND SHAFTING



Silicon nitirde shaft and rotor is mainly used in aluminum foundry. The rotor is designed and machined specifically to be capable of stirring uniformly the molted aluminum, and to disperse the gas.

Compared with graphite shaft and rotor, silicon nitride degassing shaft and rotor has much higher strength and longer lifespan, it can help aluminum factories to save many costs.

• FEATURES

- Moulding: Cold isostatic pressing(CIP)
- Sintering: GPSN (gas pressure sintering)
- High strength & good compactness
- Resists build-up of dross
- High thermal shock resistance
- No wetting by molten aluminum and other non-ferrous molten metal
- Good corrosion resistance
- Best price/performance ratio

PHYSICAL AND CHEMICAL INDEX

Types	Gas Si3N4
Density	>3.2g/cm ³
Si3N4 content	>92%
Flexural strength	>700Mpa
Compressive strength	>1500Mpa
Porosity	0
Thermal expansion coeff.(RT-1000°C)	3.2
Max temperature In air	1400°C
Hardness(HRA)	>92

